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54トナー補給装置

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## 明細書

### 1. 考案の名称

トナー補給装置

### 2. 実用新案登録請求の範囲

- 1) 補給ホッパの口部にびん口を取付けることができるトナー補給びんのびん口を、外部から押開らくことができる栓体で閉じ、補給ホッパの口部に、前記栓体を押開らく開栓部材を設けたことを特徴とするトナー補給装置。
- 2) 前記栓体がトナー補給びん内部に設けた弾性部材でびん口に、圧接するよう付勢された実用新案登録請求の範囲第1項記載のトナー補給装置。

### 3. 考案の詳細な説明

本考案は例えば電子写真複写機等のトナー補給装置に関する。

本明細書において、「トナー」の用語は二成分現像剤のみならず、一成分現像剤をも含む意味に用いる。

周知のように、電子写真複写機等においては、



運転に伴なつて消費したトナーを補充する必要があるが、従来のトナーは合成樹脂製のびんや容器に詰めてある。したがつて、トナー補給を行なうには、栓を開けたびん等を片向けながら複写機機体の補給ホツバに均一にトナーを振分けねばよい。しかしながら、このようなトナー補給方法では、開栓時に指先が汚れたり、トナー補給中に補給ホツバから舞上つたトナーが周囲に飛散して環境を汚染したり、びん等に残つたトナーが床面にこぼれて衣服を汚損する場合がある。

本考案は、以上に述べたような従来のトナー補給の実態に鑑み、補給ホツバの口部にびん口を取付けることができるトナー補給びんのびん口を、外部から押開らくことができる栓体で閉じ、補給ホツバの口部に、前記栓体を押開らく開栓部材を設けることを提案するものである。

以下、図面に示す実施例により本考案の詳細を説明する。

第1図～第8図は本考案の第1実施例を示し、複写機機体の内部に設けられる補給ホツバAの口

部1に取付けることができるトナー補給びんBは、合成樹脂材料より細口丸びんとしてプロー成形される本体2を有し、この本体2の大口径の底部にはおねじ8が形成してある。そして前記本体2の内部には補給用トナーTが収容してあり、その底部開口は前記おねじ8に螺合できるめねじ9をもつた円形の底ふた5で閉鎖される。

また、前記底ふた5の内部中央には本体2の中心部に位置した細い案内筒6が一体成形され、この案内筒6の内部には圧縮ばね7が落込んである。一方、前記本体2は補給ホツバAの口部1に嵌入できる細口部8を有し、この細口部8の内部肩面9には硬質ゴム等で作つた栓体10が着座される。同栓体10の内端部には前記案内筒6中に摺動可能に内挿される摺動樺11が固定され、この摺動樺11の先端面には前記圧縮ばね7が圧接される。また、栓体10の外端部には本体2の細口部8から外部に突出された係合樺12が固定してある。前記補給ホツバAの口部1には前記係合樺12の先端面を衝止できる開栓部材即ちスパイダ13

が位置される。このスパイダ 18 は第 8 図示のように半径方向の複数のリブ 14 と、これらのリブ 14 の中央に一体成形された円形のパッド 15 とから構成してあり、補給用トナー T は前記リブ 14 の間に形成された空間を通つて補給ホッパ A の内部に投入される。

第 1 実施例のトナー補給装置は、以上のような構造であるから、栓体 10 は圧縮ばね 7 の力で閉鎖されているので、トナー補給びん B を第 1 図示のように倒立しても、収容された補給用トナー T が外部へこぼれることはない。したがつて、トナー補給を行なうには、トナー補給びん B を倒立させて補給ホッパ A の口部 1 にトナー補給びん B の細口部 8 を一致させ、第 2 図示のようにトナー補給びん B を下方に強く押せばよい。即ち、トナー補給びん B を強く押せば、係合桿 12 がスパイダ 18 に衝止され、栓体 10 が圧縮ばね 7 の力に抗して押上げられ、栓体 10 が開らき、トナー補給びん B 中の補給用トナー T が補給ホッパ A 中に流出する。また、トナー補給後に、トナー補給びん B

に加えた力を解くと、圧縮ばね7の復元力により栓体10が閉じるから、トナー補給びんBの取外し時にトナー補給びんB中に残つたトナーが外部へこぼれることはない。

第4図及び第5図は本考案の第2実施例を示し、複写機機体の内部に設けられる補給ホツバA1の口部1Aに取付けることができるトナー補給びんB1は、合成樹脂材料より細口丸びんとしてプロ一成形される本体2Aを有し、この本体2Aの大口径の底部には環状突起16が一体成形してある。そして前記本体2Aの内部には補給用トナーTが収容しており、その底部開口は前記環状突起16に弾力的に係合できる環状溝17をもつた円形の底ふた5Aで閉鎖される。

また、前記底ふた5Aの内部中央には本体2Aの中心部に位置した細い案内筒6Aが一体成形され、この案内筒6Aの内部には圧縮ばね7Aが落込んである。一方、前記本体2は補給ホツバA1の口部1Aに嵌入できる細口部8Aを有し、この細口部8Aの内部肩面9Aには硬質ゴム等で作つた栓体10A

が着座される。同栓体10Aの内端部には前記案内筒6A中に摺動可能に内挿される摺動棒11Aが固定され、この摺動棒11Aの先端面には前記圧縮ばね7Aが圧接される。また、栓体10Aの外端部には本体2Aの細口部8Aから外部に突出された係合桿12Aが固定してある。

前記補給ホッパA1の口部1Aは蝶ふた18で閉じてある。この蝶ふた18は蝶軸19で補給ホッパA1に枢支されるものであつて、前述した圧縮ばね7よりも充分に弱いばね20で閉鎖方向に付勢してある。また蝶ふた18は角度をもつて折立てたストップ突起21を有し、したがつて、蝶ふた18はストップ突起21が補給ホッパA1の下面に衝止されるまで開放されることがある。

第2実施例のトナー補給装置は、以上のような構造であるから、栓体10Aは圧縮ばね7Aの力で閉鎖されているので、トナー補給びんB1を第9図示のように倒立しても、収容された補給用トナーティアが外部へこぼれることはない。したがつて、トナー補給を行なうには、トナー補給びんB1を

倒立させて補給ホツバ A1 の口部 1A にトナー補給びん B1 の細口部を一致させ、第 5 図示のようにトナー補給びん B1 を下方に強く押せばよい。即ち、前述したように圧縮ばね 7A の力はばね 20 の力よりも充分に大きくしてあるので、係合桿 12A の先端部により蝶ふた 18 が先づ押開られ、ストッパ突起 21 が補給ホツバ A の下面に衝止されると、圧縮ばね 7A が縮み、栓体 10A が第 5 図示のように開放し、トナー補給びん B1 中の補給用トナー T が補給ホツバ A1 中に流出する。また、トナー補給後に、トナー補給びん B1 に加えた力を解くと、圧縮ばね 7A の復元力により栓体 10A が閉じるから、トナー補給びん B1 の取外し時にトナー補給びん B1 中に残つたトナーが外部へこぼれることはない。そして、補給ホツバ A1 からトナー補給びん B1 を取外すと、蝶ふた 18 がばね 20 の力で閉じるので、補給ホツバ A1 中で舞上つたトナーが外部へ飛散するのを防止できる。

第 6 図及び第 7 図は本考案の第 3 実施例を示し、補給用トナー T を収容されるトナー補給びん B2

は、合成樹脂材料より細口丸びんとしてプレー成形される本体2Bを有し、この本体2Bの大口径の底部にはおねじ8Bが形成してある。そして本体2Bの底部開口は前記おねじ8Bに螺合できるめねじ4Bをもつた底ふた5Bで閉鎖される。また、前記底ふた5Bの内部中央には本体2Bの中心部に位置した細い案内筒6Bが一体成形され、この案内筒6Bの内部には圧縮ばね7Bが落込んである。一方、前記本体2Bの細口部8Bには補給ホツバA2の口部1Bのめねじ22に螺合できるおねじ28が形成される。

前記本体2Bの細口部8Bの内部肩面9Bには硬質ゴム等で作つた栓体10Bが着座され、同栓体10Bの内端部には前記案内筒6B中に摺動可能に内挿される摺動桿11Bが固定される。また、栓体10Bの外端部には後述する開栓桿24の先端を受入れるへこみ25が形成してある。

他方、補給ホツバA2の上面開放部はつまみ26を持って開放できる開閉蓋27で覆つてあり、同補給ホツバA2の口部中心には基部24aを補給ホ

ツバ A2 に固定した "L" 字状の開栓棒 24 が位置される。

第 8 実施例のトナー補給装置は、以上のような構造であるから、栓体 10B は圧縮ばね 7B の力で閉鎖されているので、トナー補給びん B2 を第 6 図示のように倒立しても、収容された補給用トナー T が外部へこぼれることはない。したがつて、トナー補給を行なうには、補給ホツバ A2 の開閉蓋 27 を開らき、トナー補給びん B2 の細口部 8b のおねじ 28 を補給ホツバ A2 のめねじ 22 にねじ込めばよい。即ち、トナー補給びん B2 のねじ込みに伴なつて栓体 10B のへこみ 25 に開栓棒 24 の先端が係合し、この開栓棒 24 が押上げられるので、栓体 10B が第 7 図示のように開らき、トナー補給びん B2 中の補給用トナー T が補給ホツバ A2 中に投入される。また、トナー補給後に、補給ホツバ A2 からトナー補給びん B2 を外すと、圧縮ばね 7B の力により栓体 10B が閉鎖位置に戻るので、トナー補給びん B2 中に残つたトナーが外部へこぼれることはない。なお、補給ホツバ



A2 からトナー補給びん B2 を取外した後、開閉蓋 27 を閉じれば、補給ホツバ A2 中で舞上つたトナーが外部へ飛散するのを防止できる。

第 8 図及び第 9 図は本考案の第 4 実施例を示し、補給用トナー T を収容されるトナー補給びん B8 は、合成樹脂材料より細口丸びんとしてブロー成形される本体 2C を有し、この本体 2C の大口径の底部にはおねじ 8C が形成してある。そして前記本体 2C の内部には補給用トナー T が収容してあり、その底部開口は前記おねじ 8C に螺合できるめねじ 4C をもつた円形の底ふた 5C で閉鎖される。

また、前記底ふた 5C の内部中央には本体の中心部に位置した細い案内筒 6C が一体成形され、この案内筒 6C の内部には圧縮ばね 7C が落込んである。一方、前記本体 2C は補給ホツバ A8 の口部 1C に嵌入できる細口部 8C を有し、この細口部 8C の内部肩面 9C には硬質ゴム等で作つた栓体 10C が着座される。同栓体 10C の内端部には前記案内筒 6C 中に摺動可能に内挿される摺動極

11C が固定され、この摺動樋 11C の先端面には圧縮ばね 7C が圧接される。また、栓体 10C の外端部には本体 2C の細口部 8C から外部に突出された係合棒 12C が固定してある。

前記補給ホッパ A8 の口部 1C はトナー補給びん B8 の細口部 8C で押開らくことができる一対の蝶ふた 28A, 28B で閉じてある。図示を省略するばねで閉鎖方向に付勢されるこれらの蝶ふた 28A, 28B は補給ホッパ A8 に蝶番でそれぞれ取付けられるものであつて、トナー補給びん B8 の細口部 8C を補給ホッパ A8 の口部 1C に完全に嵌入したとき、第 9 図示のように細口部 8C の先端で押開らかれる。

前記補給ホッパ A8 の内部即ち蝶ふた 28A, 28B の下方位置には、係合棒 12C の先端面を衝止するスパイダ 29 が位置される。このスパイダ 29 は半径方向のリブ 30 によって支持されたペッド 31 を有し、補給用トナー T はこれらのリブ 30 の間に形成される空間を通して補給ホッパ A8 中に流入できる。

第4実施例は、以上のような構造であるから、栓体10Cは圧縮ばね7Cの力で閉鎖されているので、トナー補給びんB8を第8図示のように倒立しても、収容された補給用トナーTが外部へこぼれることはない。したがつて、トナー補給を行なうには、トナー補給びんB8を倒立させて補給ホツバA8の口部にトナー補給びんB8の細口部8Cを一致させ、第9図示のようにトナー補給びんB8を下方に押込めばよい。即ち、トナー補給びんB8の押込みによつて、細口部8Cの先端で蝶番た28A, 28Bが押開らかれ、係合桿12Cの先端部がスペイダ29のパッド81に衝止される。したがつて、トナー補給びんB8をさらに押込めば、圧縮ばね7Cが縮み、栓体10Cが開放してトナー補給びんB8中の補給トナーTが補給ホツバA8中に流出する。また、トナー補給後に、トナー補給びんB8に加えた力を解くと、圧縮ばね7Cの復元力により栓体10Cが閉じるから、トナー補給びんB8の取外し時にトナー補給びんB8中に残つたトナーが外部へこぼれることはない。そし

て、補給ホツバ A8 からトナー補給びん B8 を取外すと、補給ホツバ A8 の口部 1C は蝶ふた 28A, 28B で自動的に閉じられるので、補給ホツバ A8 中で舞上つたトナーが外部へ飛散するのを防止できる。

第 10 図～第 12 図は本考案の第 5 実施例を示し、補給用トナー T を収容されるトナー補給びん B4 は、合成樹脂材料より有底の広口丸びんとしてプロー成形される本体 2D を有し、この本体 2D の大口径の口部には樹脂成形されるキャップ 82 のねじ 83 が螺合されるめねじ 84 が形成される。キャップ 82 は補給ホツバ A4 の口部 1D に嵌合できる口部 85 をもつたものとして合成樹脂材料でロート状に成形されており、同口部 85 の内部肩面には長さ方向に伸縮できる栓体 10D が着座される。

栓体 10D は外力で押縮み可能なじや腹腔 10a をもつたものとして中空に成形されており、キャップ 82 の口部 85 から外部へ突出した頭部 10b を有している。そして、栓体 10D の基部 10c は

本体 2D とキャップ 32との間に位置した受板 86 により支持される。受板 86 は栓体 10D の基部 10c を支持する求心方向の複数のリブ 87 を有し、したがつて、本体 2D 中に収容された補給用トナー T はこれらのリブ 87 の間の空間を通つてキャップ側に流出する。

一方、補給ホツバ A4 の口部 1D には前記栓体 10D の頭部 10b を衝止できる開栓部材即ちスパイダ B8 が位置される。このスパイダ B8 は半径方向の複数のリブ 89 と、これらのリブ 89 の中央に一体成形された円形のパッド 40 とから構成してあり、補給用トナー T は前記リブ 89 の間に形成された空間を通つて補給ホツバ A4 の内部に投入される。

第 5 実施例のトナー補給装置は、以上のような構造であるから、トナー補給びん B4 の口部 35 は、栓体 10D の弾性により閉鎖されているので、トナー補給びん B4 を第 10 図示のように倒立しても、収容された補給用トナー T が外部へこぼれることはない。したがつて、トナー補給を行なうに

は、トナー補給びんB4を倒立させて補給ホツバA4の口部1Dにトナー補給びんB4の口部85を一致させ、第11図示のようにトナー補給びんB4を下方に強く押せばよい。即ち、トナー補給びんB4を強く押せば、栓体10Dの頭部10bがスパイダ88に衝止され、栓体10Dのじや腹腔10aが縮むから、栓体10Dが開らき、トナー補給びんB4中の補給用トナーTが補給ホツバA4中に流出する。また、トナー補給後に、トナー補給びんB4に加えた力を解くと、栓体10D自体の復元力により栓体10Dが閉じるから、トナー補給びんB4の取外し時にトナー補給びんB4中に残つたトナーが外部へこぼれることはない。

以上の説明から明らかのように、本考案によれば、補給用トナーに全く手を触れずにトナー補給を行なうことができるので、手や衣服等がトナーで汚れることがなく、補給ホツバの口部をトナー補給びんで閉じた状態でトナー補給を行なうので、補給ホツバ中で舞上つたトナーの外部飛散を防止できる。また、本考案で用いるトナー補給びんの

栓体は補給ホツバから取外す際に自動的に閉じるので、トナー補給びん中に残つたトナーが誤まつて床面等にこぼれるのを防止できる効果がある。

#### 4. 図面の簡単な説明

第1図は本考案の第1実施例によるトナー補給装置の断面図、第2図はトナー補給時の同装置の断面図、第3図は同装置の要部拡大斜視図、第4図は本考案の第2実施例によるトナー補給装置の断面図、第5図はトナー補給時の同装置の断面図、第6図は本考案の第3実施例によるトナー補給装置の断面図、第7図はトナー補給時の同装置の断面図、第8図は本考案の第4実施例によるトナー補給装置の断面図、第9図はトナー補給時の同装置の断面図、第10図は本考案の第5実施例によるトナー補給装置の断面図、第11図はトナー補給時の同装置の断面図、第12図は第11図のⅩ-Ⅹ線に沿う断面図である。

T…補給用トナー、

A, A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>, A<sub>4</sub>…補給ホツバ、

B, B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub>…トナー補給びん、

10, 10A, 10B, 10C, 10D …栓体、

18 …スパイダ(開栓部材)、

18 …開閉蓋(開栓部材)、

24 …開栓桿(開栓部材)、

29 …スパイダ(開栓部材)、

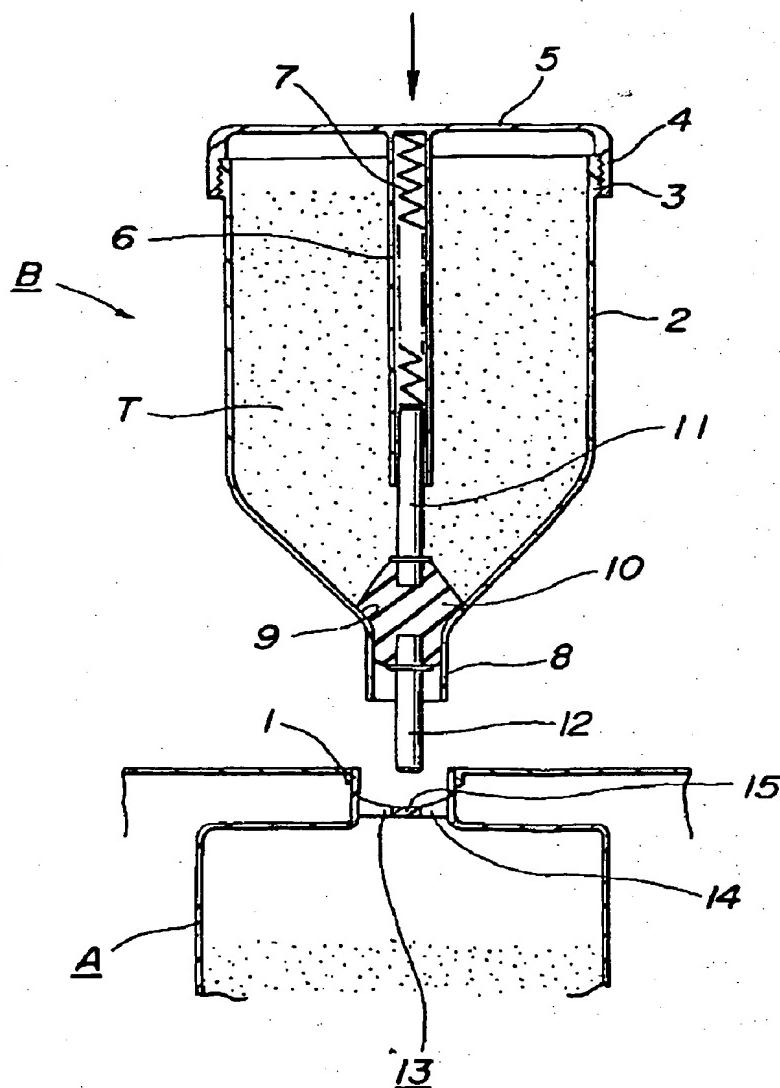
88 …スパイダ(開栓部材)。

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代理人 弁理士 太田光弘



第 1 図



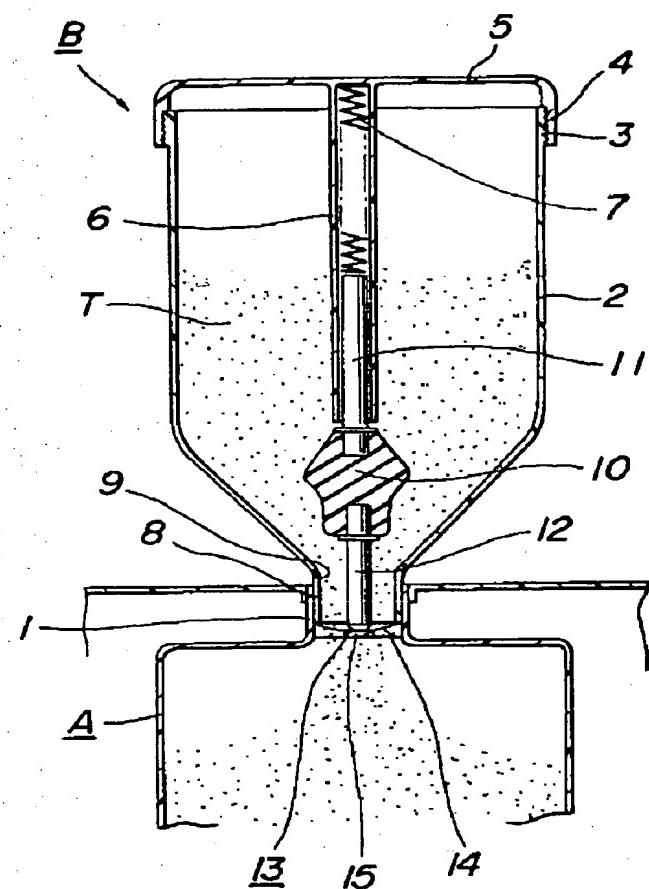
589

実用 59-38459

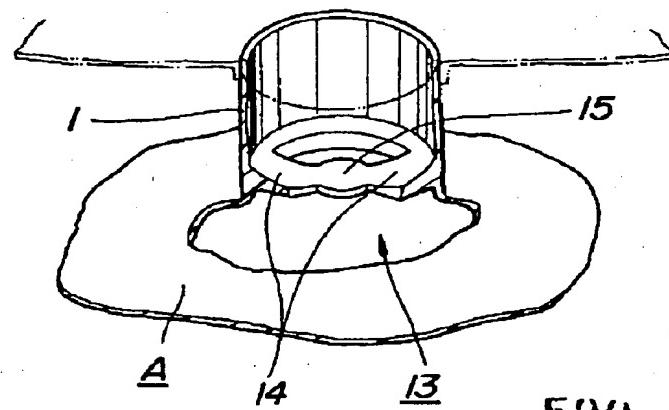
实用新案登録出願人 小西六写真工業株式会社  
代理人 弁理士 太田晃弘



第 2 図



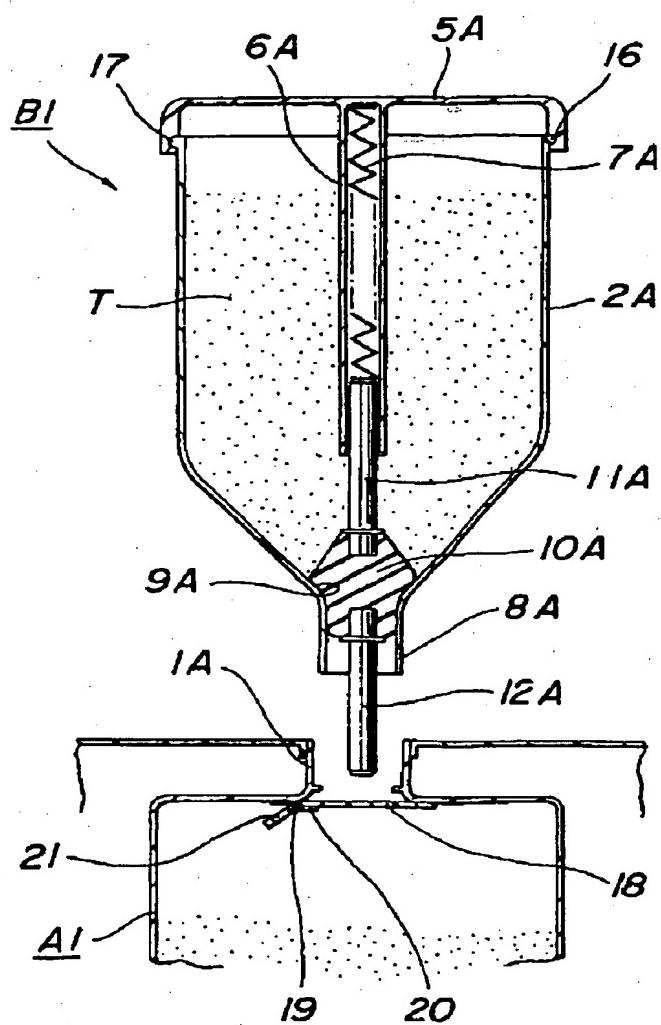
第 3 図



530

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第 4 図

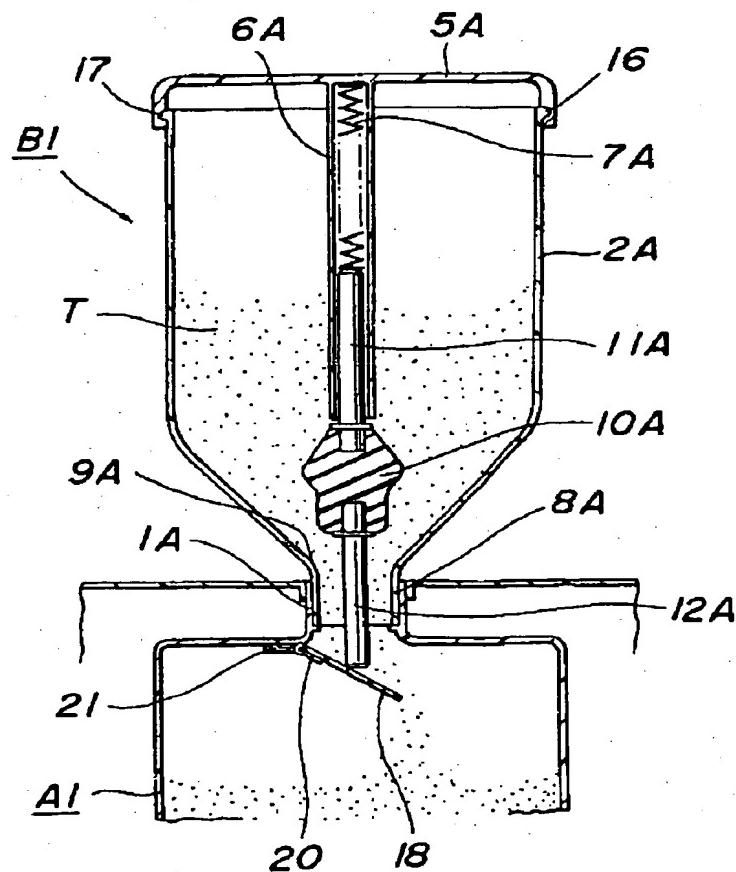


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## 第 5 図



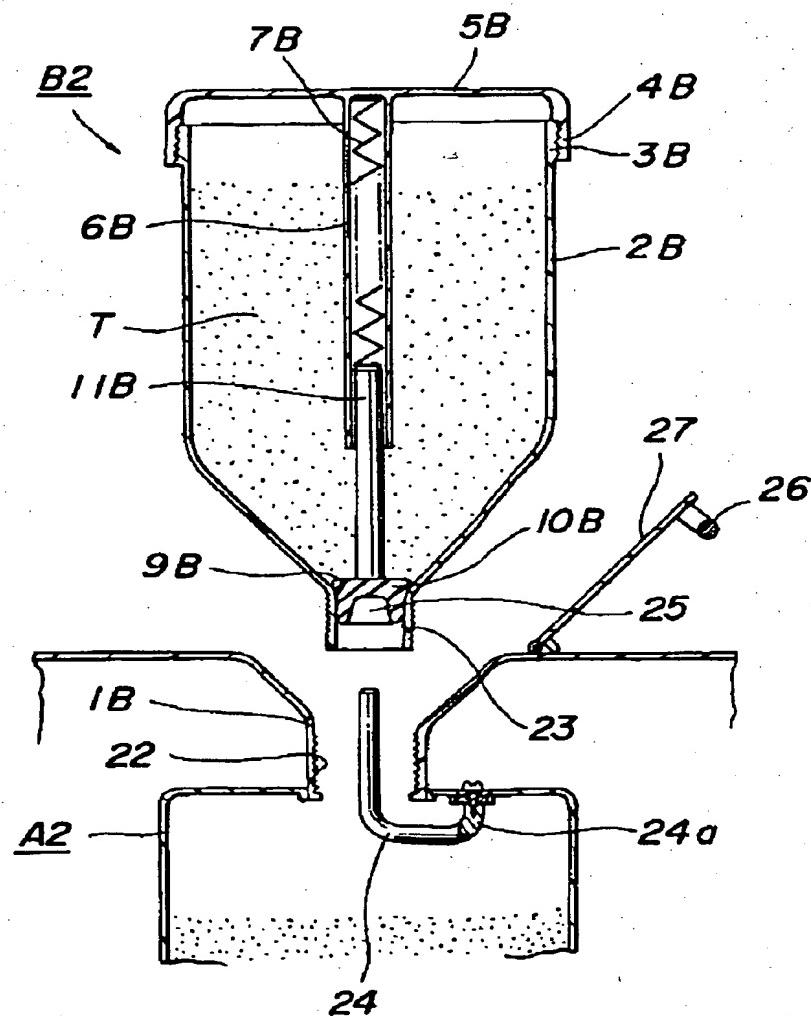
実開59-38459

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第 6 図

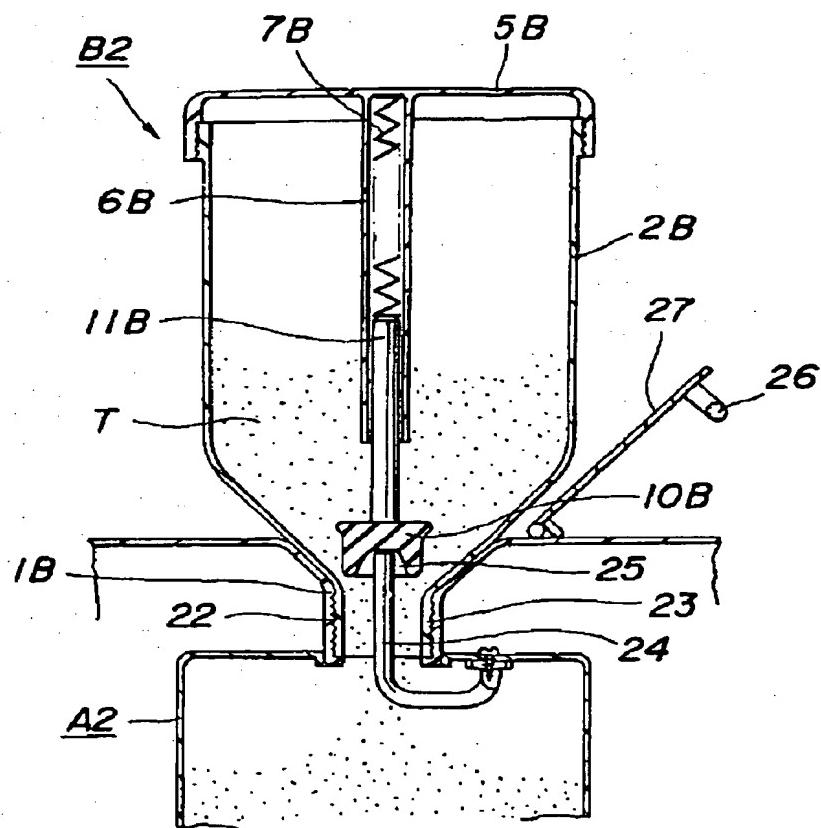


実開 59-38459  
593.

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## 第 7 図



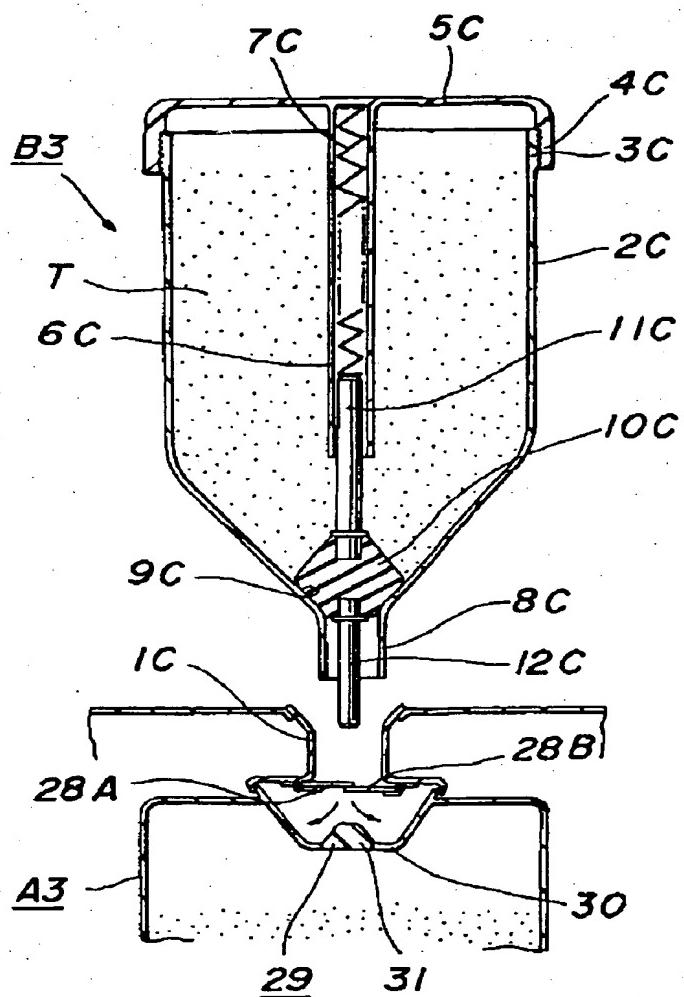
実開59-38459

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第 8 図

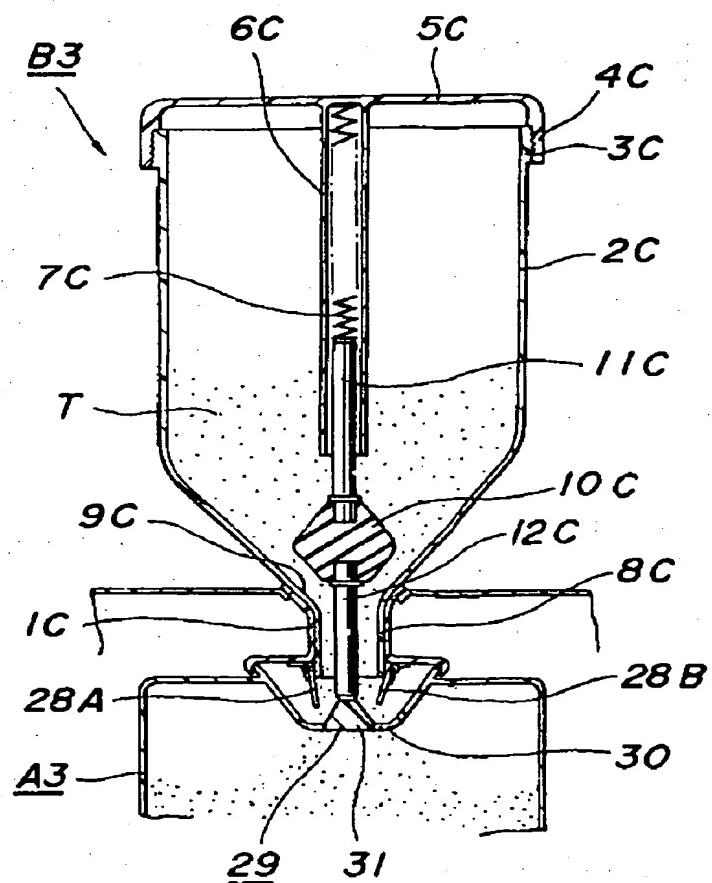


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## 第 9 図

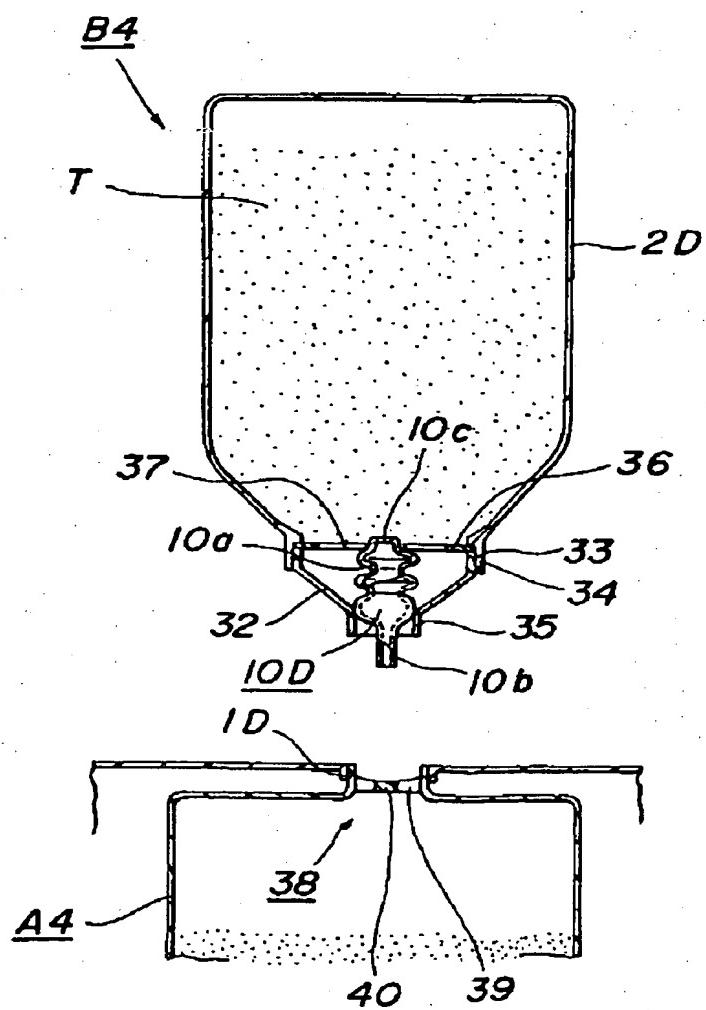


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第 10 図

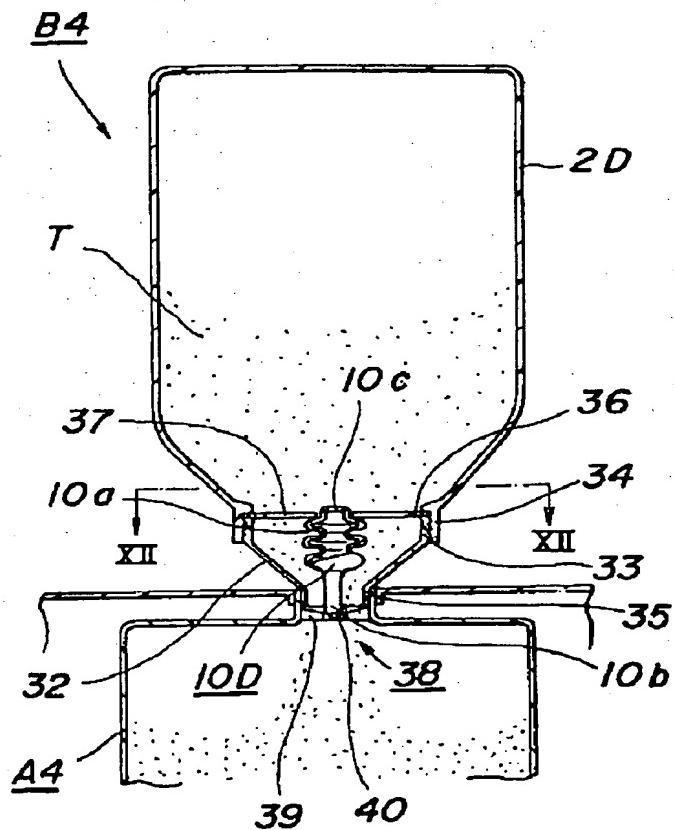


美開 59-38459  
597

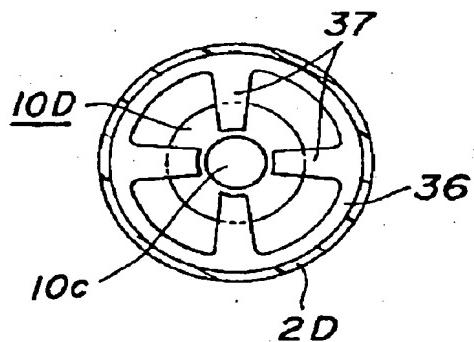
实用新案登録出願人 小西六写真工業株式会社  
代理人弁理士 太田晃弘



第 11 図



第 12 図



実開 59-38459

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Japanese Laid-open Utility Model

Laid-open Number: Sho 59-38459

Laid-open Date: March 10, 1984

Application Number: Sho 57-131782

Filing Date: August 31, 1982

Applicant: Konica Minolta Sogo Service Co., Ltd.

Specification

1. Title of the Device

Toner replenishing apparatus

2. Scope of Claims for Utility Model Registration

1) A toner replenishing apparatus, characterized in that a bottle mouth of a toner replenishing bottle whose bottle mouth can be attached to a mouth portion of a replenishing hopper is closed by a plug member that can be pushed open from outside, and that a plug opening member for pushing open the plug member is provided to the mouth portion of the replenishing hopper.

2) A toner replenishing apparatus according to Claim 1, wherein the plug member is urged into press contact with the bottle mouth by an elastic member provided in an inner portion of the toner replenishing bottle.

3. Detailed Description of the Device

The present device relates to a toner replenishing apparatus for an electrophotographic copying machine or the like.

The term "toner" as used herein refers not only to an electrostatic toner of two-component developer but also to a toner of one-component developer.

As is well known, in electrophotographic copying machines or the like, it is necessary to replenish toner that has been used up during an operation of the electrophotographic machines. Conventionally, toner is contained in a bottle or a container made of synthetic resin. Accordingly, toner replenishment can be performed by uniformly directing toner into a replenishing hopper of a copying machine base while tilting an opened bottle or the like. With such a toner replenishing method, however, there are cases where fingertips are stained with toner at the time of opening the bottle, the toner stirred up into the air from the replenishing hopper during toner replenishment scatters around and contaminates the environment, and the toner remaining in the bottle, or the like spills onto the floor to stain or damage the clothes.

In view of the above-described problems associated with conventional toner replenishment, the present device proposes a structure in which a bottle mouth of a toner replenishing bottle whose bottle mouth can be attached to a mouth portion of a replenishing hopper is closed by a plug member that can be pushed open from outside, and in which a plug opening member for pushing open the plug member is provided to the mouth portion of the replenishing hopper.

Hereinbelow, the present device will be described in detail by way of embodiments thereof shown in the drawings.

Figs. 1 through 8 show a first embodiment of the present device. A toner replenishing bottle B, which can be attached to a mouth portion 1 of a replenishing hopper A provided in the inner part of a copying machine

base, has a main body 2 that is formed as a narrow-mouthed round bottle by blow molding from a synthetic resin material, with a male thread 8 being formed at the large-diameter bottom portion of the main body 2. Further, replenishing toner T is accommodated in the main body 2, and the bottom opening of the main body 2 is closed by a circular bottom lid 5 having a female thread 4 capable of threaded engagement with the male thread 8.

Further, formed integrally with the inner central portion of the bottom lid 5 is a narrow guide tube 6 located in the central portion of the main body 2, with a compression spring 7 being disposed in the inner part of the guide tube 6. On the other hand, the main body 2 has a narrow mouth portion 8 that can be fitted into the mouth portion 1 of the replenishing hopper A. A plug member 10 made of hard rubber or the like is seated on an inner shoulder surface 9 of the narrow mouth portion 8. Fixed to the inner end portion of the plug member 10 is a slide bar 11 that is slidably inserted in the guide tube 6, with the compression spring 7 being brought into press contact with the distal end surface of the slide bar 11. Further, fixed to the outer end portion of the plug member 10 is an engaging bar 12 protruding outward from the narrow mouth portion 8 of the main body 2.

Located in the mouth portion 1 of the replenishing hopper A is a plug opening member, that is, a spider 13 with which the distal end surface of the engaging bar 12 comes into contact and engages. As shown in Fig. 3, the spider 13 is composed of multiple radial ribs 14 and a circular pad 15 formed integrally at the center of the ribs 14. The replenishing toner T is put into the replenishing hopper A through of the space defined between the ribs 14.

The toner replenishing apparatus of the first embodiment is constructed as described above. Since the plug member 10 closes due to the force of the compression spring 7, even when the toner replenishing bottle B is inverted as shown in Fig. 1, the replenishing toner T accommodated therein does not spill out. Accordingly, toner replenishment can be performed by inverting the toner replenishing bottle B to bring the narrow mouth portion 8 of the toner replenishing bottle B into alignment with the mouth portion 1 of the replenishing hopper A, and then strongly pushing the toner replenishing bottle B downward as shown in Fig. 2. That is, by strongly pushing the toner replenishing bottle B, the engaging bar 12 is brought into contact and engagement with the spider 13, whereby the plug member 10 is pushed upward against the force of the compression spring 7 so the plug member 10 opens, allowing the replenishing toner T in the toner replenishing bottle B to outflow into the replenishing hopper A. Further, when the force applied to the toner replenishing bottle B is released after the toner replenishment, the plug member 10 closes due to the restoring force of the compression spring 7, so that any toner remaining in the toner replenishing bottle B does not spill out at the time of detaching the toner replenishing bottle B.

Figs. 4 and 5 show a second embodiment of the present device. A toner replenishing bottle B1, which can be attached to a mouth portion 1A of a replenishing hopper A1 provided in the inner part of a copying machine base, has a main body 2A that is formed as a narrow-mouthed round bottle by blow molding from a synthetic resin material, with an annular protrusion 16 being integrally formed with the large-diameter bottom portion of the main body 2A. Further, the replenishing toner T is accommodated in the main body 2A, and the bottom opening of the main body 2A is closed by a circular

bottom lid 5A having an annular groove 17 capable of elastic engagement with the annular protrusion 5A.

Further, formed integrally with the inner central portion of the bottom lid 5A is a narrow guide tube 6A located at the central portion of the main body 2A, with a compression spring 7A being disposed in the inner part of the guide tube 6A. On the other hand, the main body 2 has a narrow mouth portion 8A that can be fitted into the mouth portion 1A of the replenishing hopper A1. A plug member 10A made of hard rubber or the like is seated on an inner shoulder surface 9A of the narrow mouth portion 8A. Fixed to the inner end portion of the plug member 10A is a slide bar 11A that is slidably inserted in the guide tube 6A, with the compression spring 7A being brought into press contact with the distal end surface of the slide bar 11A. Further, fixed to the outer end portion of the plug member 10A is an engaging bar 12A protruding outwards from the narrow mouth portion 8A of the main body 2A.

The mouth portion 1A of the replenishing hopper A1 is closed by a hinged lid 18. The hinged lid 18, which is pivotably supported to the replenishing hopper A1 by means of a hinge shaft 19, is urged in the closing direction by a spring 20 exerting a force sufficiently smaller than that of the compression spring 7A. Further, the hinged lid 18 has a stopper protrusion 21 that is bent at an angle, allowing the hinged lid 18 to remain open until the stopper protrusion 21 comes into contact and engagement with the lower surface of the replenishing hopper A1.

The toner replenishing apparatus of the second embodiment is constructed as described above. Since the plug member 10A closes due to the force of the compression spring 7A, even when the toner replenishing bottle B1 is inverted as shown in Fig. 4, the replenishing toner T accommodated therein does not spill out. Accordingly, toner replenishment can be performed by inverting the toner replenishing bottle B1 to bring the narrow mouth portion of the toner replenishing bottle B1 into alignment with the mouth portion 1A of the replenishing hopper A1, and then strongly pushing the toner replenishing bottle B1 downward as shown in Fig. 5. That is, since, as described above, the force of the compression spring 7A is made sufficiently larger than the force of the spring 20, the hinged lid 18 is first pushed open by the distal end portion of the engaging bar 12A; when the stopper protrusion 21 comes into contact and engagement with the lower surface of the replenishing hopper A1, the compression spring 7A contracts, causing the plug member 10A to open as shown in Fig. 5, whereby the replenishing toner T in the toner replenishing bottle B1 outflows into the replenishing hopper A1. Further, when, after replenishing toner, the force applied to the toner replenishing bottle B1 is released, the restoring force of the compression spring 7A causes the plug member 10A to close, whereby toner remaining in the toner replenishing bottle B1 does not spill out at the time of detaching the toner replenishing bottle B1. Further, upon detaching the toner replenishing bottle B1 from the replenishing hopper A1, the hinged lid 18 closes due to the force of the spring 20, thereby making it possible to prevent any toner stirred up into the air inside the replenishing hopper A1 from scattering outwards.

Figs. 6 and 7 show a third embodiment of the present invention. A toner replenishing bottle B2 accommodating replenishing toner T has a main body 2B that is formed as a narrow-mouthed round bottle by blow molding from a synthetic resin material, with a male thread 3B being formed at the large-diameter bottom portion of the main body 2B. Further, the bottom

opening of the main body 2B is closed by a bottom lid 5B having a female thread 4B capable of threaded engagement with the male thread 3B. Further, formed integrally with the inner central portion of the bottom lid 5B is a narrow guide tube 6B located in the central portion of the main body 2B, with a compression spring 7B being disposed in the inner part of the guide tube 6B. On the other hand, formed in a narrow mouth portion 8B of the main body 2B is a male thread 23 capable of threaded engagement with a female thread 22 in a mouth portion 1B of the replenishing hopper A2.

A plug member 10B made of hard rubber or the like is seated on an inner shoulder surface 9B of the narrow mouth portion 8B of the main body 2B. Fixed to the inner end portion of the plug member 10B is a slide bar 11B that is slidably inserted in the guide tube 6B. Further, formed in the outer end portion of the plug member 10B is a recess 25 for receiving the distal end of a plug opening bar 24 that will be described later.

On the other hand, the top opening portion of the replenishing hopper A2 is covered with an opening/closing lid 27 that can be opened while gripping a knob 26. Located in the center of the mouth portion of the replenishing hopper A2 is an L-shaped plug opening bar 24 whose proximal portion 24a is fixed to the replenishing hopper A2.

The toner replenishing apparatus of the third embodiment is constructed as described above. Since the plug member 10B is closed by the force of the compression spring 7B, even when the toner replenishing bottle B2 is inverted as shown in Fig. 6, the replenishing toner T accommodated therein does not spill out. Accordingly, toner replenishment can be performed by opening the opening/closing lid 27 of the replenishing hopper A2 and then pushing the male thread 23 in the narrow mouth portion 8B of the toner replenishing bottle B2 into the female thread 22 of the replenishing hopper A2. That is, as the toner replenishing bottle B2 is pushed in, the distal end of the plug opening bar 24 comes into engagement with the recess 25 of the plug member 10B and the plug opening bar 24 is lifted up, thus causing the plug member 10B to open as shown in Fig. 7, whereby the replenishing toner T in the toner replenishing bottle B2 is put into the replenishing hopper A2. Further, when, after the toner replenishment, the toner replenishing bottle B2 is detached from the replenishing hopper A2, the plug member 10B returns to the closing position due to the force of the compression spring 7B so that any toner remaining inside the toner replenishing bottle B2 does not spill out. It should be noted that when the opening/closing lid 27 is closed after detaching the toner replenishing bottle B2 from the replenishing hopper A2, it is possible to prevent any toner stirred up into the air inside the replenishing hopper A2 from scattering outwards.

Figs. 8 and 9 show a fourth embodiment of the present device. A toner replenishing bottle B3 accommodating replenishing toner T has a main body 2C that is formed as a narrow-mouthed round bottle by blow molding from a synthetic resin material, with a male thread 3C being formed at the large-diameter bottom portion of the main body 2C. Further, the replenishing toner T is accommodated in the main body 2C, and the bottom opening of the main body 2C is closed by a circular bottom lid 5C having a female thread 4C capable of threaded engagement with the male thread 3C.

Further, formed integrally with the inner central portion of the bottom lid 5C is a narrow guide tube 6C located in the central portion of the main body, with a compression spring 7C being disposed in the inner part of the guide tube 6C. On the other hand, the main body 2C has a

narrow mouth portion 8C that can be fitted into a mouth portion 1C of a replenishing hopper 3A. A plug member 10C made of hard rubber or the like is seated on an inner shoulder surface 9C of the narrow mouth portion 8C. Fixed to the inner end portion of the plug member 10C is a slide bar 11C that is slidably inserted in the guide tube 6C, with the compression spring 7C being brought into press contact with the distal end surface of the slide bar 11C. Further, fixed to the outer end portion of the plug member 10C is an engaging bar 12C protruding outward from the narrow mouth portion 8C of the main body 2C.

The mouth portion 1C of the replenishing hopper A3 is closed by a pair of hinged lids 28A, 28B that can be pushed open by the narrow mouth portion 8C of the toner replenishing bottle B3. The hinged lids 28A, 28B, which are each urged in the closing direction by a spring (not shown), are each attached to the replenishing hopper A3 by means of a hinge. As shown in Fig. 9, the hinged lids 28A, 28B are pushed open by the distal end of the narrow mouth portion 8C when the narrow mouth portion 8C is fully fitted into the mouth portion 1C of the replenishing hopper A3.

Located within the replenishing hopper A3, that is, below the hinged lids 28A, 28B, is a spider 29 with which the distal end surface of the engaging bar 12 comes into contact and engages. The spider 29 has a pad 31 supported by radial ribs 30, so the replenishing toner T can flow into the replenishing hopper A3 by way of the space defined between the ribs 30.

The fourth embodiment is constructed as described above. Since the plug member 10C is closed by the force of the compression spring 7C, even when the toner replenishing bottle B3 is inverted as shown in Fig. 8, the replenishing toner T accommodated therein does not spill out. Accordingly, toner replenishment can be performed by inverting the toner replenishing bottle B3 to bring the narrow mouth portion 8C of the toner replenishing bottle B3 into alignment with the mouth portion of the replenishing hopper A3, and then pushing the toner replenishing bottle B3 downward as shown in Fig. 9. That is, as the toner replenishing bottle B3 is pushed in, the hinged lids 28A, 28B are pushed open by the distal end of the narrow mouth portion 8C, whereby the distal end portion of the engaging bar 12 is brought into contact and engages with the pad 31. Accordingly, as the toner replenishing bottle B3 is further pushed in, the compression spring 7C contracts, causing the plug member 10C to open, whereby the replenishing toner T in the toner replenishing bottle B3 flows into the replenishing hopper A3. Further, when, after the toner replenishment, the force applied to the toner replenishing bottle B3 is released, the plug member 10C is closed by the restoring force of the compression spring 7C, whereby any toner remaining in the toner replenishing bottle B3 does not spill out at the time of detaching the toner replenishing bottle B3. Then, upon detaching the toner replenishing bottle B3 from the replenishing hopper A3, the mouth portion 1C of the replenishing hopper A3 is automatically closed by the hinged lids 28A, 28B, thereby making it possible to prevent toner stirred up into the air in the replenishing hopper A3 from scattering outwards.

Figs. 10 through 12 show a fifth embodiment of the present device. A toner replenishing bottle B4 accommodating replenishing toner T has a main body 2D that is formed as a wide-mouthed bottomed round bottle by blow molding from a synthetic resin material. Formed at the large-diameter mouth portion of the main body 2D is a female thread 34 with which a male thread 33 of a cap 32 formed by resin molding is threadedly engaged. The

cap 32 is molded from a synthetic resin material into a funnel-like configuration having a mouth portion 35 that can be fitted into a mouth portion 1D of a replenishing hopper A4. A plug member 10D capable of expanding and contracting in the longitudinal direction is seated on the inner shoulder surface of the mouth portion 35.

The plug member 10D, which is formed as a hollow member having a bellows barrel 10a that can be pushed into contraction by an external force, has a head portion 10b protruding outward from the mouth portion 35 of the cap 32. Further, a proximal portion 10c of the plug member 10D is supported by a receiving plate 36 located between the main body 2D and the cap 32. The receiving plate 36 has multiple ribs 37 extending in the centripetal direction and supporting the proximal portion 10c of the plug member 10D. Accordingly, the replenishing toner T accommodated in the main body 2D outflows toward the cap through the space defined between the ribs 37.

On the other hand, located in the mouth portion 1D of the replenishing holler A4 is a plug opening member, that is, a spider 38 with which the head portion 10b of the plug member 10D can come into contact and engage. The spider 38 is composed of multiple radial ribs 39 and a circular pad 40 that is integrally formed at the center of the ribs 39. The replenishing toner T is put into the replenishing hopper A4 by way of the space defined between the ribs 39.

The toner replenishing apparatus of the fifth embodiment is constructed as described above. Since the mouth portion 35 of the toner replenishing bottle B4 is closed by the elastic force of the plug member 10D, even when the toner replenishing bottle B4 is inverted as shown in Fig. 10, the replenishing toner T accommodated therein does not spill out. Accordingly, toner replenishment can be performed by inverting the toner replenishing bottle B4 to bring the mouth portion 35 of the toner replenishing bottle B4 into alignment with the mouth portion 1D of the replenishing hopper A4, and then strongly pushing the toner replenishing bottle B4 downward as shown in Fig. 11. That is, by strongly pushing the toner replenishing bottle B4, the head portion 10b of the plug member 10D is brought into contact and engagement with the spider 38, causing the bellows barrel 10a of the plug member 10D to contract, whereby the plug member 10D becomes open and the replenishing toner T in the toner replenishing bottle B4 outflows into the replenishing hopper A4. Further, when the force applied to the toner replenishing bottle B4 is released after the toner replenishment, the plug member 10D is closed due to the restoring force of the plug member 10D itself, whereby toner remaining in the toner replenishing bottle B4 does not spill out at the time of detaching the toner replenishing bottle B4.

As is apparent from the foregoing description, according to the present device, toner replenishment can be performed without touching the replenishing toner with hand at all, whereby hands, clothes, or the like are not stained with toner. Further, since toner replenishment is performed with the mouth portion of the replenishing hopper closed by the toner replenishing bottle, it is possible to prevent toner stirred up into the air in the replenishing hopper from scattering outwards. Further, the plug member of the toner replenishing bottle which is used in the present device is automatically closed upon detachment of the toner replenishing bottle from the replenishing hopper, thereby achieving the effecting of preventing toner remaining in the any toner replenishing bottle from

accidentally spilling onto the floor or the like.

#### 4. Brief Description of the Drawings

Fig. 1 is a sectional view of a toner replenishing apparatus according to a first embodiment of the present device, Fig. 2 is a sectional view of the apparatus during toner replenishment, Fig. 3 is an enlarged main portion perspective view of the apparatus, Fig. 4 is a sectional view of a toner replenishing apparatus according to a second embodiment of the present device, Fig. 5 is a sectional view of the apparatus during toner replenishment, Fig. 6 is a sectional view of a toner replenishing apparatus according to a third embodiment of the present device, Fig. 7 is a sectional view of the apparatus during toner replenishment, Fig. 8 is a sectional view of a toner replenishing apparatus according to a fourth embodiment of the present device, Fig. 9 is a sectional view of the apparatus during toner replenishment, Fig. 10 is a sectional view of a toner replenishing apparatus according to a fifth embodiment of the present device, Fig. 11 is a sectional view of the apparatus during toner replenishment, and Fig. 12 is a sectional view taken along the line XII-XII of Fig. 11.

T ... replenishing toner

- A, A1, A2, A3, A4 ... replenishing hopper
- B, B1, B2, B3, B4 ... toner replenishing bottle
- 10, 10A, 10B, 10C, 10D ... plug member
- 13 ... spider (plug opening member)
- 18 ... opening/closing lid (plug opening member)
- 24 ... plug opening bar (plug opening member)
- 29 ... spider (plug opening member)
- 38 ... spider (plug opening member)

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